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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/621,694 | 07/16/2003 | Aaditya Mahajan | TRQ-12957 | 1499 |

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| EXAMINER | |
|---|---|
| LEE, PATRICK J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2878 | |

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/621,694 | MAHAJAN ET AL. | |
| | Examiner | Art Unit | |
| | Patrick J. Lee | 2878 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. This action is in response to amendment filed July 14th, 2005.

### *Drawings*

2. The drawings were received on 7/14/2005. These drawings are acceptable.

### *Allowable Subject Matter*

3. The indicated allowability of claimed subject matter from the previous office action is withdrawn in view of the newly discovered reference(s) to US 6,420,728 B1 to Razeghi and US 4,218,143 to Bottka. Rejections based on the newly cited reference(s) follow.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-8, 10, & 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,479,032 to Forrest et al in view of US 6,420,728 B1 to Razeghi.

With respect to claim 1, Forrest et al disclose a light detection system comprising: an InP substrate layer (15) and InGaAs layers (11, 13) with a sublattice indium concentration greater than 53% (see Figure 1B & column 3, lines 1-7). However, Forrest et al does not disclose the use of a Gallium Arsenide substrate. Razeghi discloses such through a photodetector with a GaAs substrate being able to be substituted for an InP substrate (see Razeghi abstract and column 9, lines 17-18). To modify the teachings of Forrest et al accordingly would have been obvious to one of ordinary skill in the art because the GaAs substrate can provide a suitable platform to stack the detection layers while allowing light to pass through.

With respect to claims 2-3 & 10, the modified Forrest et al disclose a substrate (15) and layers (17, 21, 23, 25, 9) that comprise a metamorphic buffer layer having a varying composition to lattice match the substrate (15) with the absorption layers (11) (see column 3, lines 7-9).

With respect to claim 4, the modified Forrest et al does not disclose the structure to be of a metal-semiconductor-metal photodiode.

With respect to claims 5-7, the modified Forrest et al disclose the indium concentration to be greater than 53% (see column 6, lines 62-66), but does not explicitly disclose the sublattice indium concentrations as claimed. Such would have been

obvious to one of ordinary skill in the art in order to allow for the device to function for different wavelengths of light.

With respect to claim 8, the modified Forrest et al disclose areas (35, 37, 39), contacts (40, 44, 46), and electrical contacts (43, 45, 47), but does not explicitly disclose the use of p-type anodes and n-type cathodes. However, such would have been obvious to one of ordinary skill in the art because such would allow for proper transfer of the signal detected in the absorption layer to processing and output devices.

With respect to claim 20, Forrest et al disclose a light detection system comprising: an InP substrate layer (15) as a substrate structure; and InGaAs layers (11, 13) with a sublattice indium concentration greater than 53% (see Figure 1B & column 3, lines 1-7) as a photoconversion structure formed on the substrate structure. However, Forrest et al does not disclose the use of a Gallium Arsenide substrate. Razeghi discloses such through a photodetector with a GaAs substrate being able to be substituted for an InP substrate (see Razeghi abstract and column 9, lines 17-18). To modify the teachings of Forrest et al accordingly would have been obvious to one of ordinary skill in the art because the GaAs substrate can provide a suitable platform to stack the detection layers while allowing light to pass through.

With respect to claims 21-24, the modified Forrest et al disclose the indium concentration to be greater than 53% (see column 6, lines 62-66), but does not explicitly disclose the sublattice indium concentrations as claimed. Such would have been obvious to one of ordinary skill in the art in order to allow for the device to function for different wavelengths of light.

With respect to claims 25-26, the modified Forrest et al disclose a substrate (15) and layers (17, 21, 23, 25, 9) that comprise a metamorphic buffer layer having a varying composition to lattice match the substrate (15) with the absorption layers (11) (see column 3, lines 7-9).

With respect to claim 27, the modified Forrest et al disclose areas (35, 37, 39), contacts (40, 44, 46), and electrical contacts (43, 45, 47), but does not explicitly disclose the use of p-type anodes and n-type cathodes. However, such would have been obvious to one of ordinary skill in the art because such would allow for proper transfer of the signal detected in the absorption layer to processing and output devices.

7. Claims 9 & 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,479,032 to Forrest et al in view of US 6,420,728 B1 to Razeghi and in further view of US 4,218,143 to Bottka.

The combination of teachings of Forrest et al in view of Razeghi teach the device as described in the discussion of claims 1-8, 10, & 20-27.

With respect to claims 9 & 11, the combination of teachings of Forrest et al in view of Razeghi does not explicitly disclose the use of a reflective layer disposed such that the substrate is in between the detector and the reflective layer. Bottka discloses such by disposing substrate (10) between detector (32) and reflective layer (16). To modify the teachings of Forrest et al and Razeghi with those of Bottka would have been obvious to one of ordinary skill in the art because it would maximize the absorption (see abstract).

With respect to claims 12-14, the modified Forrest et al disclose the indium concentration to be greater than 53% (see column 6, lines 62-66), but does not explicitly disclose the sublattice indium concentrations as claimed. Such would have been obvious to one of ordinary skill in the art in order to allow for the device to function for different wavelengths of light.

With respect to claims 15-16, the modified Forrest et al disclose a substrate (15) and layers 17, 21, 23, 25, 9) that comprise a metamorphic buffer layer having a varying composition to lattice match the substrate (15) with the absorption layers (11) (see column 3, lines 7-9).

***Allowable Subject Matter***

8. Claims 28-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 28, Forrest et al disclose the etched layer (33) located above photodetection layers (11, 13). However, this does not disclose nor suggest the etch stop layer between the n-type cathode layer and the metamorphic buffer layer. As a result, claims 28-33 are objected.

***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J. Lee whose telephone number is (571) 272-

2440. The examiner can normally be reached on Monday through Friday, 8:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick J. Lee
Examiner
Art Unit 2878

PJL
August 26th, 2005

Stephone B. Allen
Primary Examiner